

Title: Impacts of Assimilating MLS Temperature on the Upper Stratosphere in GEOS-5

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Submission to Aura Science Team Meeting

Abstract

Standard configurations of the GEOS-5 data assimilation system use nadir infrared and microwave sounders that provide deep-layer constraints on the thermal structure in the stratosphere. In the upper stratosphere, this information is currently provided by the Advanced Microwave Sounding Units (AMSU-As) on NOAA's polar-orbiting satellites. The highest peaking AMSU-A channel (14) peaks near 2.5hPa. Evaluation of the upper stratosphere reveals substantial biases in the temperature, caused in part by biases in the underlying GCM, and difficulties in representing the stratopause structure under disturbed conditions. This work demonstrates, unsurprisingly, that the assimilation into GEOS-5 of temperature profiles derived from EOS-Aura MLS leads to a substantially better representation of the stratopause structure from a climatological perspective and for disturbed events.

Future plans with GEOS-5 include a reanalysis that includes numerous "research" datasets alongside the operational NOAA datasets that were used in MERRA. As preparation for this reanalysis, the present study examines how assimilating the MLS observations impact the error statistics for the AMSU-A instruments. Discussion will address the issue of bias correction for the AMSU-A Channel 14 radiances, which is presently turned off in GEOS-5 because of the absence of accurate temperature observations that can anchor the GEOS-5 analyses. The issue of what can be done in periods when no limb-sounder data are available will also be addressed.